



SNYDERVILLE BASIN SPECIAL RECREATION DISTRICT
SUMMIT COUNTY, UTAH

COMMUNITY-WIDE TRAIL SYSTEM DESIGN AND DEVELOPMENT STANDARDS

Snyderville Basin Special Recreation District
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DEFINITIONS

The following definitions will be used in this book of design, construction and maintenance.

Bicycle. A device propelled exclusively by human power having two tandem wheels.

Bicycle lane. A portion of a roadway that has been designated for preferential or exclusive use by bicycles. It is distinguished from that portion of the roadway designated for motor vehicular traffic by a paint stripe, curb or other similar device.

Bicycle Route, Bikeway. Any road, street, path or way, which in some manner is specifically designated as being open to bicycle travel, regardless of whether such facilities are designated for the exclusive use of bicycles or are to be shared with other transportation modes.

Community-wide trail system: The public trail system that is managed, maintained and owned (or easement held) by the Snyderville Basin Special Recreation District to service the residents and visitors within the District boundaries.

Construction Standards: Standards determined by the Snyderville Basin Special Recreation District for trail construction that will define surface, width, grade, materials, signage and safety features required for community trails within the District boundaries.

The District: The Snyderville Basin Special Recreation District.

Link and link points: Locations along the trail that provide a junction or connection to another trail, trailhead, and public roadway or community feature.

Loop: A trail that begins and ends in the same location with the majority of the trail to be a continuous experience.

Multi-use trail: A trail designed for more than one user type such as joggers, equestrians, cyclist, etc., and may require more than one surface type.

Neighborhood trail: A trail that is within a planned neighborhood area and is owned, managed and maintained by an entity other than the District. Neighborhood trails may connect into the community-wide trail system. Neighborhood Trails may or may not be open to the public.

Spur: A trail that splits off from another trail.

Trailhead: A designated area at the beginning of, or along, the Community-wide trail corridor that is used for parking, signage, and staging for trail users.

Trail Proposal And Evaluation Process

Every trail within the jurisdiction of the Snyderville Basin Special Recreation District must be well designed, planned and constructed in order to best serve the public and meet the goals of the District. Due to the importance of each trail link within the Trails Master Plan, the District has created a trail design approval process.

This process helps guide the design and improve the quality of trails while they are still in the conceptual stage to generate high-quality trails.

How to propose a new trail

The Snyderville Basin Special Recreation District will apply the outline on the following pages as they examine a trail proposal and prepare specific design recommendations on the proposed trail project.

If you are proposing a trail project, you need to address all of the issues in this outline. The outline exists to help you design your trail and to help the County gather as much information about your trail as needed. The outline makes it easier for you and the District to optimize opportunities and to spot and correct problems in the conceptual stage.

In your written proposal, you may use any format you choose as long as you address all the issues in this outline.

In completing your proposal, take the following into account:

- Be familiar with the site of the trail and with your proposed trail alignment in that site.
- Review the District's goals for the Snyderville Basin Trails master Plan.
- Refer to the trail design guidelines that pertain to the particular trail. The trail should meet as many of these guidelines as possible.

- Refer to Section 3, Trail Design Process and Guidelines to get knowledge of the construction techniques needed to build and maintain the trail.

Responses should be detailed and refer to specific sections of the design guidelines.

A. General Information

1. Briefly describe the location of the trail and why a trail is desirable here. Include the purpose of the trail (destination trail, recreational trail, connector trail).
2. Who are the expected users of the trail?
3. Is the trail clearly suited for some users at the exclusion of others? Can use of this trail be provided for the physically challenged?
4. Are any user conflicts expected and how does the trail design work to mitigate the conflicts and/or avoid them.
5. Which trail type are you proposing (hard surface multiple use, crusher fines, or natural surface).
6. What aspect of your trail design will assure its proper function, considering all factors listed above?

B. Mapping

A site map is required for all trail plan reviews.

1. 1:24,000 series topographic map or a superior topographic map as the base, enlarged to a 1"=200' scale, that depicts the "parent" property as well as the surrounding 200-300' perimeter adjoining lands, and the location of the present or proposed trail, as well as all immediately surrounding land uses, including roads, platted lots, structures, and other uses.
2. Transcribe to the site map, and prepare a map key of potential "1041 Hazards" from the following list:

Geologic Hazards
Soils
Avalanche Hazard
Debris Flows
Rockfall

Slopes
Wildfire Hazard
Wildlife Habitat
Floodplain
Wetlands
Scenic Overlay
Historic Resources
Areas around facilities

3. On the mapped trail alignment, note the locations of major structures such as bridges, underpasses, large cuts or fills, large retaining walls, trailheads, etc. Also, if known, locate any easements, utilities, or agricultural parcels that are in or adjoin the alignment.
4. The applicant's engineer shall provide to the District two reproducible drawings and an ArcView/ CAD drawing file compatible with the District's / County's GIS system of the final plat or site plan containing trail alignment information.

C. Relationship Between Trail and Site

1. Is the site inherently interesting? If so, how? If not, how can the trail create the best experience, and would another alignment create a more interesting site?
2. Describe the sequence of ecosystems and environments the trail will pass through and how this will create an interesting experience for the user.
3. How will the trail be designed and constructed in an unobtrusive way, as to appear the trail has always been there?
4. How will trail structures blend with the landscape?
5. Describe the site preservation and revegetation techniques that will be used to keep and maintain trailside vegetation.
6. What trail features will be highlighted, and how will this be done?
7. What hazards are present?
8. Could the alignment disturb sensitive environments such as wetlands, wildlife corridors, steep slopes, etc.?

Could any of the problems identified be mitigated? Any other possible alignments which could avoid the sensitive areas?

9. What are the impacts of the trail and trail corridor on adjacent landowners?
10. If the trail passes through an agricultural parcel, how might agricultural uses be impacted? How will any impacts be minimized or mitigated?
11. If site repair is to be used in any part of the trail corridor, explain what will be done and how this will blend with the remainder of the site and trail.
12. Describe the width of the trail corridor and how the width changes to accommodate various features. Where the corridor is narrow, explain how the trail can fit in the corridor. Where on the site plan is the recommended final easement location?
13. Are there any alternative alignments, which could eliminate or mitigate any problems revealed elsewhere in this proposal?

D. Safety and Human Aspects

1. In what ways will safety be designed into the trail?
2. What are the widths of the trail and other design features for accommodating the expected number of users?
3. If the trail crosses any driveways, streets, roads highways, or other trafficways, how will the crossing be handled? If the crossing is not grade-separated, can another alignment be found or created that is ground separated.
4. How will the privacy of neighbors along the trail corridor be preserved?
5. If this trail is to be used in the winter, what features will be incorporated for winter use?

E. Construction--Guarantee

1. Who will build the trail?
2. Of the construction standards given for your trail type, list by name, all which are applicable to this trail. For major, labor intensive, expensive, or

- unusual construction items, give the number of and approximate lengths of bridges, approximate lengths and heights of retaining walls, trailhead requirements, etc. Please give the District as much detail as you can.
3. Given all of the environmental elements (snow, revegetation requirements, etc.), what months of the year could the trail be constructed?
 4. Are there sections of the trail difficult to build because of a difficult site, access problems, low clearance, buried and overhead utilities, etc.? If these conditions exist, how can these parts of the trail be built?
 5. What type of construction easement is required for this section of trail? This is typically 50'.

Guarantee

1. Based on the timeline or construction schedule for public trails within the development, the developer shall deposit the sum of 120% of the estimated cost of construction in cash escrow, or some other appropriate form of guarantee approved by the District, to assure the completion of the proposed trail system. The Developer shall enter into an Improvement Escrow Fund Agreement with the District, outlining the parameters of the guarantee.
2. The Developer shall pay inspection fees in the amount of 1.5% of the estimated cost of public trail construction to the District upon application of the first grading permit or low impact development activity permit for construction of the trail system. This shall be incorporated into the Improvement Escrow Fund Agreement.
3. After the completion of each trail, the developer shall warrant the workmanship and materials and construction of each trail for a period of two (2) years and shall provide a maintenance bond in the amount of ten (10%) percent of the construction

cost of each trail, which shall be in place for a period of five (5) years.

4. All trails constructed under the provisions of this Agreement and as required by any Agreements with Summit County, shall be constructed in compliance with the public trail construction standards adopted by the District.
5. Prior to the construction of each trail segment, the total easement area shall be noted and defined on a plat map. Construction of backcountry or certain soft surface trails shall be allowed to meander within the easement area to the extent necessary to maintain or protect natural features, provide the best possible trail user experience, and allow for long term sustainability of the trail.
6. Trails located on Plats shall be dedicated in a form required by the District. A signature block for the District shall be required on all plats with or without community trail alignments being dedicated to the District.

TRAIL DESIGN PROCESS AND GUIDELINES

Introduction

Trails are an important and valued form of land use in the Snyderville Basin. These design and development standards have a three-fold purpose.

- A. To implement policies set forth in the Snyderville Basin General Plan (1997) regarding trails advocacy within the Snyderville Basin, in order to achieve the overall trail objectives for the community wide trail system.
- B. To provide the Summit County planning staff and Snyderville Basin Planning Commission guidance in their interpretation of the Snyderville Basin Special Recreation District Trails Master Plan, the “recreation element” of the General Plan, when responding to development projects submitted for development review.
- C. To provide the development community an understanding of the planning requirements which are to be consistently applied to each individual trail project within the community-wide trail system. Use of these standards by neighborhoods or other trail management agencies is encouraged to provide trail continuity throughout the Basin.

Design Basics

This section of the document is intended to give an overview of some of the aspects of trail design and management planning which supports the goals of the Snyderville Basin Special Recreation District. This is by no means a complete coverage of these subjects. Rather it is a primer to help conceive and improve the design of trails as

they relate to users, site, environment, construction, and maintenance.

A. Trail Purpose

The Recreation District intends for all trails to be useful for recreation. In addition, trails should be useful for non-motorized transportation where possible and appropriate.

- **Recreation Trails.** Trails can be purely recreational, such as a loop trail through an open space parcel. County recreational trails can also provide connections with and access to other trails of any type, including trails managed by other agencies and governmental bodies. As part of their recreational components, all trails should seek to access, preserve, and enhance scenic, natural, historic, geologic, open space, greenbelt, wildlife habitat, and floodplain values. The presence of the trail and its users should not adversely affect the above values of the site.
- **Recreation and transportation trails.** Through alignment, design, and construction, trails can also be useful for transportation by connecting destination points and/or by providing alternatives to the road system. These are primarily multiple use trails, which consist of hard and soft surfaces, but can also be crusher fines surface or natural surface trails that connect destinations.

Consistent with the goals and objectives of the Snyderville Basin Special Recreation District Trails Master Plan, a trail useful for transportation should also provide a good trail experience which encourages people to use the trail, optimize the trail for the same recreational and open space values as given above, and optimize the transportation function through

alignment and design which creates safe and easy movement along the trail. The design and construction specifications for each trail type are meant to enhance both recreation and, where appropriate, transportation functions.

B. TRAIL TYPE AND WIDTH

The type of trail is determined by the expected users, the usage level, and the trail purpose. The Trails Master Plan recognizes three different trail types:

1. Hard Surface Multiple Use Paths.

These are used for high-use trails that can accommodate the widest variety and volume of non-motorized vehicles and users. These paths usually serve as part of an alternate transportation system for the County and should be designed for both recreation and transportation. Usage can be year-round or seasonal depending on the path, site, and environmental conditions.

For trails to serve as effective transportation routes, they must connect to each other, be continuous within each corridor, and link transportation origins (such as neighborhoods) with transportation destinations (like schools, commercial areas, and employment centers). This often means incorporating short spur trails directly into locations that people want to reach, accommodating the full spectrum of trail users.

An adjacent and roughly parallel crusher fines or natural surface trail should be provided wherever feasible for pedestrians, runners, and equestrians who want a more natural experience or a softer surface.

While there are dozens of design elements to consider when creating a trail, the following points are key to

facilitate safe and efficient transportation use:

- When considering the width of a multi-use trail, keep in mind several factors: the primary path, often referred to as the trail tread; the path's side shoulders; and whether users should share one tread or will be separated onto multiple treads.
- The basic standard for hard surface trail types is 10' of asphalt with a 4' wide soft surface to one side. Generally, the soft surface should be on the downhill side, and should be of compacted road base or crusher fines.
- The surface should be 6" compacted road base, with 3" asphalt on the hard surface trail (95% compaction).
- The 4' soft surface must be clean and undisturbed. It should be brought to the level of asphalt. "Undisturbed" means the entire width is kept clear of sign posts, guy wires, bushes, trees, sprinkler heads, topsoil, and other items or objects. Subsurface disturbance is acceptable, but no such disturbance may take place after construction and dedication, except by specific agreement with the Recreation District.
- Vertical Clearance. Providing adequate vertical clearance for trail users is important to avoid unsafe conditions that can be created by tree branches. Clearance should be at least 10' high.
- Trail Surface Cross-Section. A trail's surface is a reflection of what lies beneath it. If you were to cut vertically through a trail, it would reveal the three layers of the trail cross-section: the subgrade, the subbase, and the trail surface. The subgrade is the native soil mass of the landscape and it

should be thoroughly compacted prior to creating the subbase, the mid-layer of the trail's cross-section. The subbase is a layer of stone and rock laid on top of the subgrade, typically at the depth of at least 6 inches, and then compacted. The trail surface is then laid on top of these two "invisible" layers of trail. Asphalt surfaces are typically laid at 3" thick, concrete and crushed stone surfaces are each installed 4"-6" thick. As a unit, these three layers determine the strength and quality of your finished trail. The trail's subgrade ultimately bears all the weight on the surface, therefore, and ideal subgrade has moderate slopes and firm, dry soils for proper drainage.

- **Drainage.** Drainage is the single most important consideration in trail design and construction. If not addressed properly in these stages, it will become the single biggest maintenance cost, or cause problems that deter trail users. There are two types of drainage flow: surface water runoff and subsurface water runoff. The ideal way to mitigate surface runoff is through an open system using swales (shallow drainage channels adjacent to trail), ditches, or sheet flow combined with on-site detention ponds. Subsurface drainage can be managed through the use of pipes, French drains, or sloped and contoured drainage channels. For successful, cost-effective drainage solutions, work with professionals landscape architects, engineers and a local Soil Conservation Service throughout the entire design process.
- **Sight Lines and Alignment.** Sight lines enable trail users to see what is ahead and to anticipate any changes in the trail conditions. Suggested site distances for bicyclists are 150 feet, longer, if possible at approaches to intersections or other potentially dangerous locations. Warning signs should be used in situations where

sharp curves or steep inclines are unavoidable because of right of way considerations, severe slopes, or the need to retain valuable trees or vegetation. The AASHTO Guide for Development of Bicycle Facilities is helpful in determining acceptable curve radii, sight distances and minimum bicycle stopping distances.

- There are two types of slopes pertinent to trail design: longitudinal slopes and cross slopes. Longitudinal slopes are changes in elevation along the running length of the trail. For an accessible trail, longitudinal slopes should not exceed five percent, with three percent preferred. Cross slopes cross the width of the trail from one side to the other to aid in water drainage. To both facilitate drainage and meet ADA requirements, a 2% cross slope is required.
 - **Design Load.** A trail's design load is the maximum weight the trail can carry at any point along its length. Trails must be accessible to emergency and maintenance vehicles as well as trail users, so design load is based on the mass of these vehicles compared against the combined structural properties of the subgrade, the subbase, and the surface as one unit. The typical minimum design load based on the static wheel load of an emergency vehicle should be 6,250 pounds and based on the gross vehicle mass should be 12,500 pounds. The maximum speed for vehicles equaling the weight of your design load should be 15 miles per hour.
2. **Soft Surface Paths.** These are suited for trails with moderate use in urban, suburban, and easily-accessed undeveloped areas but where multiple use is not provided. Neighborhood open space access, some long distance moderate-use recreational trails, and some high-use sections of frontcountry

hiking/biking trails are well suited for crusher fines surfaces. Usage includes hiking, running, biking, baby joggers, equestrian, and nordic skiers. This type of trail should be barrier free to some physically challenged individuals. Nordic use should be possible in winter when snow and site conditions permit (although trails do not necessarily have to be mechanically groomed for nordic skiing).

- The basic standard for crusher fines or road base trails is 6'-10' wide, depending on the volume of use and types.
 - Finish surface should consist of 4"-6" (6" over graded dirt or 4" over 2" of gravel).
 - Clearing width is 10'-20' and 10' high.
3. Natural Surface Trails. These are suitable for low to moderate use frontcountry and backcountry trails where a natural and undeveloped feel is desired. Natural dirt surface backcountry trails serve to accommodate hikers, runners, mountain bicyclists, equestrians, snowshoers and cross-country skiers.
- The basic standard for the natural surface trail is 4' to 6' wide, depending on the volume of use and types.
 - Construction, maintenance, and sustainability are the easiest when trail grades are below 10% and cross slopes are at least 15%.
 - Finish surface should be naturally compacted dirt for natural surface trails; all organic material scarified, large rocks removed, tree stumps and roots removed. As mentioned above, clearing should be 6'-8' wide, with a 2% + offslope.

- Clearing height of a minimum of 10' should be incorporated when equestrian use is expected. The clearing height should even be higher if x-country skiing is expected.
- Where feasible, sections near trailheads should be barrier free to physically challenged individuals.

These trails typically are best designed and constructed in the field on a case by case basis, keeping in mind grades, slopes and natural features.

Site Revegetation

- Revegetation should be performed in stages as the project progresses.
- Identify native onsite plants and revegetate with an appropriate mixture of these native plants if possible.
- In ecologically sensitive areas such as wetlands, avoid the introduction of new species.
- Planting patterns for grasses, trees, shrubs and ground covers should extend undisturbed vegetation patterns into the construction zone to replace what was once there, or to produce a naturalistic version of what might have been there.
- For new plantings, select low-maintenance, low-water species using native species whenever possible.
- Use a straw mulch or hydromulch on flat or near-flat areas. Use straw or erosion control blankets as needed to revegetate steeper slopes.
- Plantings and irrigation systems should not reduce trail sightlines or impact trail users in any form.

C. GENERAL TRAIL CORRIDOR GUIDELINES

Selecting a trail corridor is critical to meeting the goals of the Recreation and

Trails Master Plan. Not all corridors allow for the opportunity to create a good trails experience. The District considers its proposed trail system a “linear park” as its users travel along its pathway. What they see, what they can do and how they feel about their experience will determine the value of each design feature. For instance, a trail that travels along a stream corridor or passes an overlook will provide a higher value trail experience, as opposed to one next to a busy roadway or behind an uninteresting commercial building will provide a higher value trail experience.

A. Trails for Recreation: The District intends for all community, non-motorized trails to be useful for recreation. Trail alignments will pay special attention to accessing, preserving, and enhancing scenic, natural, historic, geologic and wildlife features.

1. The optimal trail alignment for recreation is a loop trail. This means that a trail begins and ends in the same location with a trailhead located at the starting point. Trailheads may provide parking, staging area and signage that identifies with length of the trail, the surface type and identifies user groups. An Example sign may include a loop map with information detailing the following: single surface natural trail. “Hiking and equestrian only. Moderate difficulty. 8% grade. 2.3 miles. No water.”

A loop trail may connect to other trails within the community-wide trail system, to neighborhood trails, along the loop or to trails outside of the District boundaries.

2. A spur that connects to the community-wide trail may

provide a good recreational experience or transportation function, especially if it provides access into wilderness, high country locations to a school or community feature.

B. Trails for recreation and non-motorized transportation: Trails designed for recreation serve a transportation function by connecting destination points and providing alternative transportation. A trail useful for transportation will also provide a recreation experience.

1. A transportation trail may include neighborhood connections to schools and commercial areas, neighborhoods to each other and neighborhoods to parks or to other recreation amenities available in the District.
2. A transportation trail may also be designed to connect Park City, Eastern Summit County, Wasatch County and Salt Lake County with the Synderville Basin. Any special trail design features used to connect Olympic venues during the 2002 Olympics should be considered a legacy to the community-wide trail system after 2002.

C. **Design Features**: The design features of the Community-wide trail system emphasize the “quality of the experience.” The District considers its proposed trail system a “linear park” and as its users travel along its pathway. What they see, what they can do and how they feel about their experience will determine the **value** of each design feature.

The following is a list of elements rated from most desirable to least desirable in designing a trail.

1. Desirable Features

- a. Trail linkages and critical connection points. A network of trails should provide as variety of recreational experiences and may, depending upon its location, serve a transportation function. Whenever possible, trails should connect and create loops that enhance the recreation experience and are identified on the District trail map. Generally desirable links are those that connect neighborhoods, schools, parks community centers, open space areas, or provide access to the backcountry.
- b. Specialized trail enhancements include creation or preservation of open space, greenbelts, wildlife habitat, flood plain values, historic and geologic features.
- c. Trail features that include interesting characteristics for the user such as historic buildings, fishing streams, curves and hills, identifiable natural point of interest, vistas, scenic view points, trees, streams and other features such as picnic areas and pleasant resting areas.
- d. Provisions for underpasses or overpasses

or other highway and interstate crossings.

- e. Provisions for boardwalks and bridges to ensure dry and safe passage along the trail.
- f. Provision of trail corridors separated and removed from the road.
- g. Separation from and undesirable roadways such as Hwy 224, Hwy 248, Hwy 40 or Interstate 80. Separation features may include berms, hedges, fencing, trees, or other appropriate screening that will provide safety features and improve the quality of the trail experience.

- Trail linkages and critical connection Points. A network of trails should provide a variety of recreational experiences and may depending upon location, serve a transportation function. Whenever possible, trails should connect and create loops and enhance the recreation experience. All are identified on the District trail map. Generally, desirable links are those that connect neighborhoods, schools, parks, community centers, open space areas, or provide access to the backcountry.

- Undesirable but acceptable trail features necessary to complete a critical trail link.
 - a. Trail connections that cross over highways and intersections.
 - b. Trails adjacent to noisy roads or unpleasant sites.
 - c. Numerous driveway crossings along the trail.

- d. Utility corridors which have a negative visual impact and/or an unnatural alignment.

USER GROUPS AND TRAIL FACILITIES

All trails within the District boundaries will be multi-use and non-motorized. Because users vary in their needs and expectations, trail design should reference construction standards and user descriptions listed below. It should be noted that not all trails will accommodate every user. Rather, the terrain, topographical features, locations, grades and safety features will be used to determine a trail's suitability for each user group.

Please refer to the attached charts for proper degree of slope and other critical design information.

Because user group types may change over time, the District reserves the right to change a surface type and alter user designations. The District also has the authority to close any trail for seasonal, safety or maintenance reasons.

- A. **Pedestrians.** This group includes a wide variety of people such as walkers, hikers, joggers, runners, people pushing baby joggers, birders, etc. The average speed of this group is 3-7 mph. Most of this user group prefers a surface softer than asphalt to prevent knee, shin and foot injuries. A soft surface next to hard would accommodate these needs adequately. Trail facilities to be considered for this group might include benches, drinking fountains, restrooms, shelters and picnic areas.
- B. **Bicyclists.** There are essentially two types of cyclists: mountain cyclists and touring (road) cyclists. Each has different equipment and

somewhat different needs. Trails constructed for this group should take into consideration sight distances, trail width and clearances. Speed is also a factor with consideration for speeds of up to 30 mph possible. Trail support facilities should include bicycle racks and good signage outlining connecting trails, on-street bike routes and protocol. Periodic rest areas, drinking fountains and restrooms are desirable.

- C. **Equestrian.** This user group prefers a soft surface of granular stone or dirt. If more than one user group will use this surface, a strong sub-base and subgrade should be used to prevent deterioration. Vertical clearance should be at least 10 feet and horizontal clearance of at least 5 feet. Speeds average between 4-6 mph. Sight distance and right of way signs are important safety features. Trail support facilities should include parking and staging facilities at trailheads, restrooms, hitching posts, picnic areas, and horse watering facilities. Attention should be given to water crossings, bridging surfaces and widths.
- D. **Cross-country Skiing / Snowshoeing.** Many multi-use trails used for bicycling, walking, and horseback riding during warm weather months are suitable for cross-country skiing and snowshoeing in winter months. If trail grooming for track setting is to take place, trail clearance must be at least 14 feet wide. Trail support facilities for winter may lack restrooms and water. Otherwise, facilities would be the same as above.

- E. **Barrier Free.** All hard surface trails should be designed, where possible, in conformance with ADA standards.
- F. **Other Users.** Recreation trends and trail features may bring other user groups onto trails. These may include skateboards, roller blades, fishermen, dog sleds, and others. The District reserves the right to change use or adjust uses based on recreational demands and new sports as they come on line.

Regulatory Signs on Trails

Following are some of the signs likely to be needed, along with their identification number and size. Some unusual signs may have to be custom made.

Stop, Yield, and Stop Ahead warnings

STOP signs are intended for use where bicyclists are required to stop. Where conditions require bicyclists but not motorists to stop, care must yield the right of way to that traffic. The visibility of approaching traffic must be adequate to permit the bicyclist to stop or take other measures to avoid that traffic.

STOP AHEAD and **YIELD AHEAD** signs should be used where an intersection cannot be seen on approach. They may also be used to emphasize the right of way at busy or dangerous intersections.

DRIVEWAY CROSSING should be used where a driveway crossing cannot be seen on approach. This sign can also emphasize busy or potentially dangerous driveway crossings.

Unexpected or hazardous conditions warnings

These should be used only when necessary to warn of unexpected or potentially hazardous conditions. The signs should be placed at least 50' before the hazard.

Turn and curve warnings

If the trail changes direction unexpectedly and the change is not readily apparent on approach, use appropriate turn or curve signs to warn bicyclists. They should normally be installed no less than 50 feet in advance of the beginning of change of alignment.

Intersection signs

Other warning signs

CAUTION and **SLOW** signs should be used only where situations warrant extra attention. Such signs tend to lose effectiveness

Fences / Railings

As part of making public trails integral parts of neighborhoods, fence designs for trail boundaries should blend and enhance the neighborhood through a complementary design. The fence design should accomplish the needs for fencing, maintain aesthetics and remain cost effective.

Fencing for circulation

Fences can be used to control user circulation on public trails within neighborhoods and private properties. Within public trail corridors, short sections of fence can be used to control the movements of users or as aesthetic elements in trailhead designs.

Boundary Fencing

If public trail alignments introduce public traffic adjacent to a formerly private area of residence, the cost of a privacy fence will be the responsibility of the developer. The landowner and District should be consulted for input on the fence design. If the landowner requests a fence that is unreasonably more expensive, the landowner should pick up the additional costs. This should be worked out between the developer and adjacent landowner.

Fencing for livestock

Livestock fences should be designed to retain livestock, and should incorporate aesthetics into the design along public trail corridors. Typically, wooden posts will be used with some combination of smooth or barbed wire or wire mesh, set back from the trail tread. Livestock fencing that exists at the time of trail construction will be moved or replaced at the expense of the party responsible for the cost of trail construction. Fencing required due to changes in land use following plat approval will be paid for by the adjacent landowner.

Fencing to emphasize boundaries

Public trail corridors can optionally be fenced to delineate or emphasize property lines. This is typically done to protect adjacent landowners from trespassing by trail users. The fence design should take into account the maintenance and construction responsibilities of the District. As mentioned in the design standards, a 20' easement is the minimum trail corridor granted

to the District and a 50' temporary construction easement is standard for new trail construction. Therefore, the District requires the developer to allow for the 50' temporary construction easement before constructing any new fencing, if the District is obligated to construct the trail. If the newly constructed fence goes in prior to the trail being constructed, the District has the right to require the developer to relocate or remove the fence for trail construction. If a long-term fence exists on the property and it is in the preferred location of the selected trail corridor, the District will pay to remove and re-construct the fence.

Railings

Railings are to be used for the safety of trail users where there is more than a 30" vertical elevations above grade at the edge or shoulder of a trail.

Railing height

Pedestrian railings shall be 42" high. Railings primarily for bicyclists on bike paths should be 54" high. For general use in mixed pedestrian /bicycle situations and in zones which are not high speed bike zones, 42" railings are preferred.

Color and preservation

Railings should be constructed with pressure-treated lumber or recycled products that are natural in color.

Bridges

Any bridge regardless of size, should be a feature and a focal point of a trail system, while at the same time not take away from the function or purpose of the trail. A bridge can change the character of an entire trail, possibly bringing users to the site and making an otherwise plain trail into a much more interesting experience.

Bridges Versus Other Alternatives

Bridges should be used to cross natural or man-made drainages which have continual running water, riparian value, and which provide user interest and enjoyment. Bridges can be any length, including very short.

Culverts can be used to cross irrigation ditches and small drainages that have little or no riparian value, and no flowing water except during and just after rain or snowmelt.

Causeways can be used to cross low areas, some floodplains, and shallow lakes or ponds.

Low trestle bridges should be used to cross short stretches of wetland with minimal disturbance. Boardwalks could also be used.

Aesthetic issues in selecting a bridge design

The aesthetic and recreational qualities of a site determine how a bridge should interact with the site:

1. If a site is spectacularly beautiful, a bridge should attempt to complement its surroundings. The best type of bridge is one that is simple and does not compete with the site.
2. If the aesthetics of the site are mediocre or if nearby development or land use has lowered the recreational values of

the area, a bridge can attempt to enhance the site and elevate the pristine value of the site by its presence.

A well-designed bridge looks like it belongs in its site. The experience of approaching, crossing, and leaving the bridge should be memorable to the trail user.

A bridge can also degrade its site through shoddy or flimsy construction, poor quality materials, use of materials that don't fit the context of surrounding development, structural materials that look too thin or utilitarian, inadequate width, or lack of maintenance.

Bridge Types

For hard surface trails, standard bridges can be either custom-made wooden bridges on wood or steel beams for short spans or factory-built steel trusses with wooden decks for longer spans.

Different designs are encouraged

Diversity and ingenuity in bridge designs are strongly encouraged, especially for historic or unusually elegant and human-scaled designs. Non-standard bridge designs should meet the following criteria:

- The design must be structurally sound.
- All parts of the bridge should look and be solid, sturdy, and grounded.
- The design should be aesthetically pleasing from all angles from which it will be seen.
- The design, materials, and motif should fit within the context of surrounding development.

Selecting a bridge type

Selection factors include:

1. Drainageway characteristics
2. The length of the span (s)
3. Load limits

4. The recreational / aesthetic qualities of the site as described above
5. Cost

Bridge Alignment

Bridges should be aligned along the path so users don't have to make sharp turns at the ends of the bridge.

Bridges do not have to be level end-to-end (construction is more complicated if a bridge is not level).

Aligning a bridge as a series of small segments on a curve is highly desirable.

Bridge abutments and piers

Abutments should have a minimal visual presence. This should be done by making the abutments as small as feasible and by using native rock, vegetation, stone retaining walls, and other techniques to visually soften the edges and blend the abutments into the site.

Both abutments and piers should be visually simple so as not to distract from the surroundings. Abutments and piers should seek to visually ground the bridge and to complement the bridge and site.

If sightlines on the trail or the surrounding site reveal large vertical concrete surfaces on abutments or piers, these faces should be bush-hammered with a pattern of small vertical parallel lines in order to visually soften the surface and remove impressions of the concrete forms.

General Planning Sequence

1. Determine the needed span of the bridge and the needed useable width of the deck.
2. Choose a superstructure option based on length of bridge and deck thickness. Select beam thickness and spacing

according to bridge width, length, dead weight, and the load requirements.

3. Calculate the railing post spacing based on having evenly-spaced posts no further than 6' apart with the end posts on the very end decking boards. The length of the bridge may have to be changed in order to space the posts evenly.
4. Determine the site locations of the ends of the bridge based on the adjusted length.
5. Calculate the depth of the superstructure plus the deck and plan the abutments accordingly.
6. Contact Army Corp of Engineers, State Department of Water Rights and the Summit County Engineer for environmental permitting.

General Materials

Lumber—All lumber should be of a type of treated wood that is resistant to decay for long term sustainability.

Avoid using wood which was pressure treated using perforations in the wood—the small holes and slits which result from this method cause splinters, disrupt the natural grain of the wood, and give an unnatural appearance.

Hardware—Use screws and bolts that will sustain the wear of the wood.

All exposed bolt and screw heads should be countersunk to be flush with the wood surface.

Painting and weathering—To minimize maintenance, the bridge should not be painted.

Pressure treated wood does not easily weather and will remain artificially green in color for years. To help give the bridge a

more natural appearance, treat the wood with three or more coats of linseed oil to help accentuate the wood and give a warmer glow to the wood. Linseed oil surfaces exposed to rain or standing water will eventually weather to a rich deep brown.

Manufacturers

A number of manufacturers fabricate steel trusses for trails. The following are manufacturers of pre-fabbed bridges:

Steadfast Bridges
1-800-828-8038

Continental Bridge
1-800-328-2047

Town & Country
1-800-328-8829

Bridge Design Factors

Complete design factors are available from the particular manufacturer.

Boardwalk

Boardwalks can be used to cross damp or occasionally flooded areas with minimal disturbance. A common use is to provide a stable and intrinsically interesting means of access to stream corridors and wetland features of general interest to all users.

Boardwalk Type 1: Decking supported by piers

The structure is supported on piers that can be used in wet areas. This type typically is raised above the ground on water level on zinc-plated screw anchor piers, making this type more resistant to frost heaving and thereby more suitable for wheelchair users. Most parts of the deck have a simple wheelguard, and some observation areas may optionally have railings. The screw anchor of the piers may be as far as 6' below ground level, but, depending, on the site, even at this depth it may still heave or settle.

Typically, this boardwalk type is used as an education facility and is optimized for recreation rather than transportation. Adding widened observation decks and designing the boardwalk with a curving shape enhance its appeal to users. Standard deck widths are 6'-10' feet wide---a 6' width provides more intimacy with the site and creates less disturbance, while an 8'-10' width is more suitable for heavily-used boardwalks.

Boardwalk design strength and users

Boardwalks are essentially bridges and must be designed to bear the live loads of users and snow loads of the site. The specifications given here for boardwalks are designed to carry pedestrian-weight users and Park City snow loads, but not vehicles or equestrians.

Design Features for Boardwalks

The nature of wetland areas is typically characterized by soft lush vegetation, slender plant and shrub stems, tufts of rounded earth and grass, rich moist smells, and perhaps standing or moving water. This specification intends to create boardwalks that accentuate the contrast between softness of wetlands and the grounded feeling of solid land.

Because boardwalks float about both land and water, this specification gives boardwalks a lighter feel than the solid, heavy and grounded feel given to trails on the ground. This lighter feel is achieved through the use of curving irregular shapes, angles other than 90 degrees, smaller-size dimension lumber, lighter-weight railing, and deck designs that conceal the foundations.

Curve and vary the deck, creating complex shapes. A boardwalk is intrinsically interesting to users and designing the boardwalk with a curving shape, adding spurs, adding widened-observation decks, and varying the width of the deck at intersections enhances its appeal to users.

When the land lends itself and is appropriate, give viewing decks and spurs complex shapes of angles and curves. Octagonal decks, irregular angles, and angles other than right angles make boardwalks much more interesting.

Boardwalk features

Benches, railings and interpretive sign can optionally be built into the boardwalk. Railings—Safety railing must be provided where it is possible to fall off into deep or fast-moving water, or where the deck surface is 30" above the ground or water surface below.

Permitting

Contact the Army Corp of Engineers, State Division of Water Rights and Summit County Engineer for proper environmental permitting.

Liabilities on Trails

The District can implement the Trails Master Plan, in part, by requiring developers and landowners to include trails internal to and connecting through the developer's property as part of the development review process. Developers and owners of undeveloped property adjacent to trail development have voiced concerns about landowners' liability. No activity is entirely free from exposure to liability, but the dedication, construction, and operation of public trails can be at the low end of the landowner liability spectrum.

To address liability concerns, Utah has adopted the Landowner's Liability Act, which states:

"The purpose of this Act is to encourage public and private owners of land to make land and water areas available to the public for recreational purposes by limiting their liability toward persons entering thereon for those purposes. The Act further provides that the owner of the land owes no duty of care to keep the premises safe for entry or use by any person using the premises for any recreational purpose or to give any warning of a dangerous condition, use structure or activity on those premises to those persons."

The Act provides further protection for landowners, including limitations on representations as to the safety of the premises, limitations on the duty of care owed to visitors and limitations on liability for injuries caused the acts of visitors while on the premises.

The Utah Landowner Liability Act was construed by the Utah Supreme Court in Crawford v. Tilley, 780 P.2d 1248 (1989). The court found the landowner not to be protected by the Utah Act because the premises on which the injuries occurred were not open to the public and were, in fact, posted "No Trespassing."

An annotation in American Law Reports suggests that counsel representing a landowner should consider, in advance of any litigation, the nature and number of warning signs that the landowner could place on his property to best take advantage of the protection from liability afforded by a recreational use statute. The annotation also suggests that counsel should advise his client to post signs that warn of the danger, but not to bar entry, such as advising entering "At Your Own Risk" (47 A.L.R. 4th 262).

Summit County Biking and Hiking Regulations Ordinance

In addition to the Utah Landowner Liability Act, the Summit County Commission has adopted an ordinance to regulate biking and hiking on designated trails in Summit County. The Ordinance No. 196 follows:

"WHEREAS, the Summit County Commission recognizes the landowners within Summit County who make their land or designated portions thereof available for public transportation or recreational purposes and afford themselves the liability protection contemplated by the Utah Landowner Liability Act (UCA 57-14-1, etseq.) and;

WHEREAS, the Summit County Commission encourages development of designated trails within the County and wishes to regulated the use of said trails in a manner which will safeguard and promote the health, safety, and welfare of trail users and landowners who directly or indirectly permit public use of their land for transportation or recreational purposes;

NOW, THEREFORE, BE IT ORDAINED BY BOARD OF COMMISSIONERS OF SUMMIT COUNTY, UTAH:

Section 1. It shall be unlawful for any person, for the purpose of biking, hiking, or other transportation or recreational activity, to willfully go upon any land area designated and posted unsafe or closed by landowner, County Sheriff, Forest Service or National Park Service.

Section 2. "Posted," as used in this Ordinance, means:

- (a) any proposal communication by the landowner, representative of the owner, the Sheriff, the Forest Service, or National Park Service, or,
- (b) fencing or other enclosures or barriers obviously designed to prevent unintentional access to an area; or,
- (c) posting of signs reasonably likely to come to the attention of persons engaged in transportation or recreational activity to willfully leave the boundaries of any designated public trail across privately owned lands without the consent of the landowner.

Section 3. It shall be unlawful for any person for the purpose of biking, hiking, or other transportation or recreational activity to willfully leave the boundaries of any designated public trail across privately owned lands without the consent of the landowner.

Section 4. Any person violating the provisions of this Ordinance shall be guilty of a Class C Misdemeanor, and be punished by a fine not to exceed \$750.00 and/or confinement in the City Jail for not more than ninety days.

ADOPTED AND PASSED by the Summit County Commission this 28th day of January, 1992.”

There are a variety of solutions to the liability concerns raised by private landowners when asked to allow public access on their properties for transportation or recreation purposes. The first, of course, is reliance on the applicable landowners’ liability statute and posting or appropriate warning signs. Another alternative includes the leasing of trail areas to the city or other governmental entity desiring public use. The more traditional method would be to convey or dedicate the trail to the City or other governmental entity in fee for title, thereby removing any status liability of the former landowner.

This is not to suggest that construction and operation of a public trail system is without liability at all, but such activities probably expose landowners and sponsoring governmental agencies to lower levels of liability for damage claims than most other activities. In fact, attempts by landowners to prevent public access to their properties may remove the protection offered by the Utah Landowners Liability Act.

Utah Liability Issues

(Produced by Fabian & Clendenin, Salt Lake City, Utah)

I. PRIVATE LANDOWNERS

A. COMMON LAW LIABILITY

Depends on user’s status

Trespasser (property posted or fenced)

No duty to warn; no duty to protect; liability only for malicious injury

Licensee (allowed on property but not invited)

Duty to warn of known dangers; no duty to protect

Invitee (business patron or social guest invited on property)

Under common law owners are driven to post property and vigorously enforce against trespass in order to get the highest level of protection

B. STATUTORY PROTECTION-LIMITATION ON LANDOWNER LIABILITY ACT (U.C.A. 57-14-1)

Purpose is to encourage owners to allow public access to private land

Applies only where:

use is recreational

landowner does not charge for use

property is open to general public

Landowner’s liability to all users under statute is same as to trespassers under common law

C. TRAIL CONSIDERATIONS

Owner of adjoining property (but not trail corridor)

No liability for accidents on trail

For accidents on adjoining private property:
if property is closed to public use, common law will apply
if property is open, statute will apply
in either case, liability is only the malicious injury
Where trail corridor is privately owned, subject to an easement granting a public right of way,
liability picture is not as clear.

Does selling an easement constitute a “charge” for public access? If so, statute may not apply
and liability would be a license or invitee

In 1997 statute was amended to specifically cover cooperative wildlife management units
(where hunter buys permit from state who remits a portion to participating landowner)

A similar amendment might be needed for trail easements

Posting Issues

Generally, property is considered open unless posted or enclosed

Some ordinances (e.g. Summit County) prohibit leaving public trails without adjoining owner’s
expressed consent.

D. PUBLIC LANDOWNERS

a. SOVEREIGN IMMUNITY

Government agencies are not liable for accidents unless immunity has been waived by statute
Immunity has been waived for sidewalks, streets and other public “structures or improvements”- does this
include trails?

b. RECREATIONAL LAND USE IMMUNITY ACT (HB 107 1999)

Restores immunity for injuries arising from the “inherent risks” of “recreational activities,” which
expressly includes hiking, bike riding and equestrian activity

c. LIMITATION ON LANDOWNER LIABILITY ACT

Statute does not apply to urban parks, but may still apply to trails across undeveloped land. See, *De
Baritault v. Salt Lake City*, 913 P.2d 743 (1996)

User Groups and Trail Facilities

1. **Pedestrians:** This group includes a wide variety of people such as walkers, hikers, joggers, runners, people pushing baby strollers, bird watchers, etc. The average speed of this group is 3-7 mph. Most of this user group prefer a surface softer than asphalt to prevent knee, shin and foot injuries. A soft surface next to hard would accommodate these needs adequately. Trail facilities to be considered for this group might include benches, drinking fountains, restrooms, shelters and picnic areas.

	<u>Easiest</u>	<u>More Difficult</u>	<u>Most Difficult</u>
Maximum Grade	5%	7%	7-10%
Max. length at this grade.	100'	300'	500'

2. **Bicyclists:** There are essentially two types of cyclists: mountain cyclists and touring (road style) cyclists. Each has different equipment and different needs. Trails constructed for this group should take into consideration sight distances, trail width and clearances. Speed is also a factor with consideration for speeds of up to 30 mph possible. Trail support facilities should include bicycle racks and good signage outlining the connecting trails, on-street bike routes and protocol. Periodic rest areas, drinking fountains and restrooms are desirable.

	<u>Easiest</u>	<u>More Difficult</u>	<u>Most Difficult</u>
Maximum Grade	6%	12%	15%
Maximum Sustained Grade	7%	10%	15%
Length	100'	300'	500'
Turning Radius	20'	12'	6'

3. **Equestrian:** This user group prefers a soft surface of granular stone or dirt. If more than one user group will use this surface, a strong sub-base and subgrade should be used to prevent deterioration. Vertical clearance should be at least 10 feet and horizontal clearance 6 feet. Speeds average between 4-6 mph. Sight distance and right of way signs are important safety features. Trail support facilities should include parking and staging facilities at trailheads, restrooms, hitching posts, picnic areas, and horse watering facilities whether natural or faucet. Attention should be given to water crossings, bridging surfaces and widths.

	<u>Easiest</u>	<u>More Difficult</u>	<u>Most Difficult</u>
Maximum Grade	10%	20%	20%

Length	200'	300'	500'
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4. **Cross-Country Skiing / Snowshoeing:** Many multi-use trails used for bicycling, walking and horseback riding during warm weather months are suitable for cross-country skiing and snowshoeing in winter months. If trail grooming for track setting is to take place, trail clearance must be at least 14 feet wide. Trail support facilities for winter may lack restrooms and water. Otherwise, facilities would be the same as above.

	<u>Easiest</u>	<u>More Difficult</u>	<u>Most Difficult</u>
Maximum Single Climb (Elevation gain of single continuous climb)	35'	70'	140'
Elevation Differential (Lowest to highest point on trail)	100'	250'	500'
Total Climb (Sum of all elev. gains)	150'	400'	650'
Greatest sustained gradient (Over 300' trail distance)	7.50%	12%	17%

5. **Barrier Free:** All hard surface trails should be designed, where possible, in conformance with ADA standards.

	<u>Easiest</u>	<u>More Difficult</u>	<u>Most Difficult</u>
Width of Trail Tread			
one-way	4'	4'	3'
two-way	8'	8'	4'
Length	0-1/2 mile	1/2-1 1/2 miles	1 1/2 to 5 miles
Surface	Hard	Hard or fine crushed rock; solidly packed	Firm packed soft surface
Clearing Width and Type	6'-10'	6'-10'	4'-5'
Slope (grade) and Vertical Climb	1%-3% vertical climb up to 80'	3%-6% vertical climb up to 160'	6%-8% vertical climb up to 12%
Rest Stops	every 100'-150'	400'-500'	800'

6. **Other Users:** Recreation trends and trail features may bring other user groups onto trails. These may include skateboards, roller blades, fisherman, dog sleds, and others. The District reserves the right to change use or adjust uses based on recreational demands and new sports as they come on line.